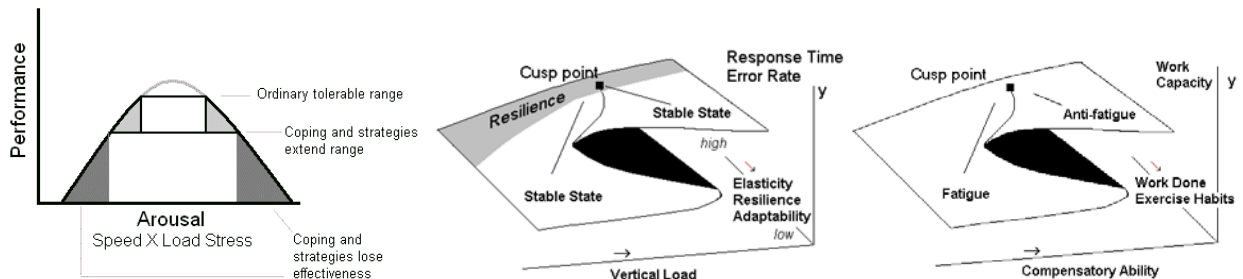


# Cognitive Workload and Fatigue in Telework

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The use of telework increased sharply in response to COVID-19. In doing so it generated large-scale transitions of work procedures, complications from working at home versus the usual physical work environment, and new sources and symptoms of mental workload and fatigue. New sources and symptoms include distractions, increased time to complete some tasks, and temporal disorientation among individuals, and team work issues related to coordination and communication difficulties. The proposed research project will examine how patterns of these difficulties evolve over time, and how they might cluster in response to different work or industry objectives. The results should lead to recommendations for reducing workload and fatigue issues and encouraging productive patterns.



**Theory** – There is an optimal level of arousal associated with workload for most tasks. When boundaries are pushed beyond the normal tolerance range, coping mechanisms are deployed. When coping ranges are exceeded, catastrophe declines in performance or surges in error rates occur. The investigators use principles of nonlinear dynamics to assess conditions where catastrophic declines will occur (diagrams above), find variables associated with elasticity versus rigidity of participants' responses to conditions, and track the emergence of symptom clusters.

Fatigue is a loss of work capacity over time. It can be produced by extended time on a particular task, loss of sleep, and task switching. Workload and fatigue are co-occurring processes, and they need to be separated analytically. Importantly, extended time on a particular task can also build momentum, positive flow, and improved performance over time under the right conditions. Both processes involve background variables and trigger variables that send performance outcomes into two different directions.

**Participants** – We need to recruit 200-500 adults whose work involves a significant amount of telework. All industrial sectors are of interest. Participants can act as individuals or be clustered as work teams. Confidentiality of participants and their organizations will be maintained throughout the research process.

**Procedures** – We would build phone and web apps to record participants' logs of telework and other tasks each day for three weeks along with ratings of workload, symptoms, and motivational flow. The logs would also count the number of task switches during the day. The logs would be preceded by intake questions concerning the type of work they do and some measure of elasticity versus rigidity that we have used in laboratory studies on cognitive workload and fatigue.<sup>1</sup> The analysis of emerging symptom clusters is accomplished with a symbolic dynamics algorithm that was developed by the investigators.

**Expected Results** – We intend to build catastrophe models for the impact of workload conditions on flow, profiles of flow and flow disturbance over time, and symptom clusters. We intend to share a report with results combined from all organizations and, where possible, provide separate reports for each participating organization.

<sup>1</sup> Technical publications are available on request.